

### **REMARKS/ARGUMENTS**

In view of the foregoing amendments and following remarks, favorable reconsideration of the pending claims is respectfully requested.

#### ***Status of the Claims***

Claims 23-30 have been examined. Claims 1-22 have been withdrawn. By way of this amendment, claims 24 and 28 are cancelled.

Claims 23 and 30 have been amended to clarify that the organic precursors are selected from **vinyl or cyclic monomers bearing protic groups**. See for example, paragraph [0038] of the US 2005/0272143 A1 Application.

Claims 26 and 27 have been amended in order to exclude the vinyl and cyclic monomers exempt from protic groups.

#### ***Prior Art Rejections***

Claims 23-30 as being unpatentable over the combination of Bertrand, International Publication No. WO 2002/098926, in view of Guiseppi-Elie, U.S. Patent No. 5,766,934.

In order to establish a prima facie case of obviousness, the combination of references must disclose or suggest each and every element of the claim. Further, the combination must be able to be combined to provide a predictable result. Teachings in the references that weigh against the combination or proposed modification support the finding of non-obviousness

Bertrand *et al.* describes a process for depositing by electro-grafting a strong adherent polymer coating onto an electrically conductive surface comprising an electro-chemical grafting at the surface of an active monomer comprising a reactive functional group for the attachment of a molecule having at least one complementary reactive group. The electro-grafted coatings disclosed in Bertrand *et al.* allows the attachment of small molecules such as proteins, peptides, oligonucleotides, dyes, drugs and anti-bacterian compounds.

Guiseppi-Elie discloses chemical and biological sensors employing a thin electrically conducting polymer film attached via covalent bond to the electrodes of a microfabricated device, said sensors being able to convert the chemical potential energy of an analyte into a proportionate electrical signal through the transducer action of the device. Neither Bertrand *et*

*al.*, nor Guiseppi-Elie mentions the use of **vinyl or cyclic monomers bearing protic groups** as now recited in independent Claim 23. Accordingly, the combination of Bertrand and Guiseppi-Elie fails to disclose or suggest the claimed invention.

However, the presence of such protic groups lead to several advantages, and more particularly to a **direct immobilization** of molecules of interest or objects bearing a complementary function on the surface of the solid support, without implementing a subsequent step of activation of the functional groups of interest borne by the electro-grafted organic film. The absence of such specific protic groups on the active monomer disclosed in Bertrand *et al.* involves necessarily an additional activation step, after the electrografting of the monomers, in order to liberate the functional groups of interest which allow the immobilization of molecules of interest or objects bearing a complementary function. As a matter of fact, in this case the immobilization is **indirect**.

Indeed, it emerges from the examples of Bertrand *et al.* that the implemented active monomers disclosed in this document do not allow a direct immobilization of the molecules of interest, because said monomers must have to be subject to a subsequent reduction reaction, before reacting and immobilizing the molecules of interest on the surface of the solid support.

More particularly, it appears from the Example 1 of Bertrand *et al.*, which implements a monomer exempt from protic groups, i. e. the  $\epsilon$ -caprolactone, that this monomer is only used as a precursor, the ethyl ester functions of the  $\epsilon$ -caprolactone having to be reduced into aluminium alkoxide groups by reaction with diisobutyl aluminium hydride (DiBA1H), before being able to attach molecules of interest or objects bearing a complementary function (see also the Scheme 1 of Bertrand *et al.*)

The difference between the direct and indirect immobilizations of molecules of interest or object bearing a complementary function is also clearly demonstrated in the Example 2 of the present Application in which vinyl or cyclic monomers bearing protic groups, such as hydroxyethyl methacrylate (which bears a hydroxyl function), is **directly** electro-grafted on the solid support, the coated solid support being thus used to attach molecules of interest or objects bearing a complementary function in a direct manner, without any subsequent reduction step or modification step of the groups borne by the electro-grafted polymer.

Moreover, the Applicant would like to draw the attention of the Examiner on the fact that it is explicitly mentioned page 1, line 32 to page 2, line 2 of Bertrand *et al.*, that the presence of protic functions, such as alcohol, protic amine and carboxylic acid, cannot be tolerated as they are reduced at a less cathodic potential than the monomer.

Consequently, the teaching of Bertrand *et al.* is completely at the opposite of the solution proposed by the present invention, as Bertrand *et al.* would have explicitly dissuaded the man skilled in the art to use monomers bearing protic groups. As such, one of ordinary skill would not have combined the teachings as the references as contemplated by the Examiner. Additionally, it is clear that Bertrand cannot be modified in view Guiseppi-Elie to provide a predictable result. For this additional reason, it is respectfully submitted that the claims are patentable over the combination of Bertrand and Guiseppi-Elie.

These fundamental difference lead to a solid support which can readily and rapidly react with molecules of interest or objects bearing a complementary function, without needed a subsequent reduction step, after the electro-grafting step (as it is the case in the prior art document of Bertrand *et al.*), the presence of vinyl or cyclic monomers bearing protic groups allowing the acceleration of the attachment of the molecules of interest on the solid support, while improving the inorganic/organic interface between the functionalized electrically conducting or semiconducting support and the functional molecules of interest.

Therefore, the combination of all the features of the amended Claim 1 was absolutely not obvious to a man skilled in the art, none of the cited prior art documents disclosing the use of vinyl or cyclic monomers bearing protic groups in combination with the presence of at least 90% of functional groups of interest accessible, and with a density for the accessible functional groups of interest comprised between  $10^4/1.\text{tm}^2$  and  $10^{10}/\mu\text{m}^2$ , in order to obtain such an advantageous solid support.

Consequently, the disclosure of Bertrand *et al.*, even in combination with the teaching of Guiseppi-Elie, does neither anticipate the solid support of the present invention, nor does teach or render obvious the present invention to a man skilled in the art.

As a consequence, the invention as claimed does fulfil non-obviousness criterion with respect to the Bertrand *et- al.* document, and consequently its patentability is completely

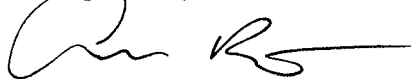
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demonstrated.

In view of the foregoing amendments and remarks, it is respectfully submitted that the rejections under 35 U.S.C. § 103(a) have been overcome, and that the pending claims are in condition for allowance.

It is not believed that extensions of time or fees for net addition of claims are required, beyond those that may otherwise be provided for in documents accompanying this paper. However, in the event that additional extensions of time are necessary to allow consideration of this paper, such extensions are hereby petitioned under 37 CFR § 1.136(a), and any fee required therefor (including fees for net addition of claims) is hereby authorized to be charged to Deposit Account No. 16-0605.

Respectfully submitted,



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